Story by Kari Miller

SHOWCASING A PROJECT

Groups work to solve stream's impairment

Buck Creek, a small fresh water stream in the Red River Basin that has excessive bacteria, is within a predominantly rural and agricultural landscape in the panhandle region of Texas. A group of cooperators is evaluating approaches to restore the stream and is developing a watershed protection plan.

With one phase and three years of monitoring completed, a group of cooperators are beginning the next step in bringing Buck Creek, a small stream in the Red River Basin, to acceptable water quality.

The creek, which runs through three counties in the southeast corner of the Texas Panhandle, is on the state's 303(d) List for not meeting water quality standards for contact recreation because of bacterial contamination.

Now, the Texas Agricultural Experiment Station, Texas Cooperative Extension and Texas Water Resources Institute (TWRI), along with the Texas State Soil and Water Conservation Board (TSSWCB), local soil and water conservation districts (SWCDs) and the Red River Authority are beginning the project's second phase to fix the problem.

In this phase, the cooperators will begin identifying specific bacteria sources, evaluating approaches for restoring the stream and developing a watershed protection plan through a stakeholder-driven process.

"This may be one of the first efforts on small streams such as this to get scientific involvement from step 1, the impairment, through the entire process of identifying the sources of nonpoint pollution and looking for solutions through a watershed management plan," said Dr. John Sij, an agronomist at The Texas A&M University System Agricultural Research and Extension Center at Vernon.

For five years, beginning in 1996, the Red River Authority conducted quarterly sampling at one site on the creek as part of the Texas Commission on Environmental Quality's Clean Rivers Program. Its data showed bacteria levels were periodically elevated at that site.

To verify these findings, the cooperating groups instituted the three-year Bacterial Monitoring for the Buck Creek Watershed project to monitor bacteria levels at 13 sites along the creek. The project was funded with 319(h) grant monies allocated to Texas through the U.S. Environmental Protection Agency (EPA) and administered by TSSWCB.

EPA guidelines state that a single water sample containing *E. coli* should not exceed 394 colonies per 100 milliliters of water. To meet the water quality standard, this level must not be exceeded more than 25 percent of the time, and the geometric mean of all samples should not exceed 126 colonies per 100 milliliters.

Phyllis Dyer, the project's watershed coordinator and research technician at the Vernon center, said the results from this monitoring confirmed indications from preliminary data—the creek exceeded the 25 percent bacteria limit at several of the sites.

Based on those results, TSSWCB funded the second phase of the project, Watershed Protection Plan Development for Buck Creek.

Lucas Gregory, TWRI Buck Creek project manager, said this phase's most important objective is the formation of a stakeholder committee to develop the watershed protection plan.

"Having a stakeholder group to guide the development of this plan will be crucial to the success of this project and the success of future implementation efforts," Gregory said.

The plan will include nine elements that outline water quality issues and management measures needed to improve the watershed's quality.

"Once completed, this plan will be a tool for area stakeholders to find information about appropriate management measures that can be implemented in the Buck Creek watershed, which, in turn, will enhance overall stream health and water quality," he said.

"This plan is 100 percent voluntary and will address the concerns of watershed stakeholders. It can only be successful if stakeholders voluntarily implement the management strategies suggested in the plan," Gregory said.

So far, there seems to be a lot of support from stakeholders, said Sij, project leader for the Buck Creek studies. "We recently had a meeting with 42 people present and most of them were landowners in that watershed," he said. "That was one of the

best-attended meetings of landowners we've probably had in the state."

The team is bringing in Dr. George Di Giovanni, an environmental microbiologist at The Texas A&M University System Agricultural Research and Extension Center at El Paso, to conduct bacterial source tracking (BST). He will use DNA analyses to identify the sources of the creek's bacteria determining whether the contamination is from human, livestock and/or wildlife waste.

Di Giovanni will use two DNA fingerprinting techniques to identify the sources of *E. coli* in Buck Creek. In addition, a new BST technique that provides presence or absence detection of ruminant, human, horse and pig fecal pollution will be used in future studies to confirm the *E. coli* results.

"BST will be used to help rank the different sources of fecal pollution in the watershed," Di Giovanni said. "BST results combined with water quality monitoring, land use patterns and watershed sanitary surveys will be used to help develop effective management strategies."

Once the bacteria sources are determined, alternative land management measures or best management practices can be developed to reduce the impacts on bacteria levels in the creek from those sources.

"If BST determines that cattle are a significant source of fecal bacteria in the watershed, the project team will develop integrated watering, grazing, shade development, feeding and prescribed burning strategies to decrease the frequency and time cattle spend near Buck Creek, " Gregory said. "Likewise, if wildlife or other sources of bacteria are identified as significant contributors, management measures to reduce the bacteria will be evaluated and recommended accordingly."

Sij said the project's second phase is expected to take three years. After bacteria sources are determined and a watershed protection plan is implemented, a third phase would begin to monitor effects of the plan and to make adjustments accordingly.

"The project could go on for five or six more years," Sij said.

Because the project is so thorough, it is something of a showcase study, he said.

"We've incorporated a scientific approach to this whole project—identifying the problem, determining what's causing the problem and developing a watershed protection plan with the stakeholders," Sij said. "We will provide the data and the stakeholders will develop it (the plan). There are repeated analyses over multiple sites from multiple years and not all sites have that. It's a start-to-finish project."
(Agricultural Communications contributed to this story.)

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Photo Caption:
Dr. George Di Giovanni and his research team—Dr. Elizabeth Casarez of El Paso, Dr. Suresh Pillai of Texas A&M-College Station and Dr. Joanna Mott of Texas A&M-Corpus Christi—received a 2007 Texas Environmental Excellence Award in Agriculture for their research in bacterial source tracking. The award was presented by the Texas Commission on Environmental Quality at its May banquet in Austin and is the state's highest environmental achievement. From left to right: Texas Senator Kip Averitt, Casarez, TCEQ Commissioner H.S. Buddy Garcia, TCEQ Commissioner Larry R. Soward and Di Giovanni.